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ABSTRACT

Distance education using various telecommunication technologies is an effective method of delivering educational programming. As educators become more aware of the potential of distance education in elementary and secondary education they need to learn how to implement cost effective distance education programs. One such program, the Midlands Consortium--which includes Alabama, Kansas, Mississippi, Missouri, and Oklahoma--has enhanced educational opportunities for students by integrating technology with instruction. Their program identified a curriculum development component and technical assistance component, as well as organizational and financial components. The Consortium's experience in paying careful attention to all of the components of the educational infrastructure has demonstrated that a successful communications satellite distance education and information network can be created and maintained. (6 references) (DB)

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PLANNING GUIDELINES FOR THE IMPLEMENTATION OF WIDE-AREA EDUCATIONAL TELECOMMUNICATION SYSTEMS

Presentation to the

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INTRODUCTION

Distance education using various telecommunication technologies, such as satellites, is an effective method of delivering various types of educational programming. In many areas of the country limited course options, few students, and the great distance between schools make distance education a cost-effective, and, in many cases, the only practical method of providing certain courses or enrichment instruction to students. As educators become more aware of the potential of distance education to meet the needs of schools, they are beginning to move beyond the question of, "Is distance education effective" to "I know distance education works but how do I design and implement a network"?

The paper which follows is based upon the experience of the author, a comprehensive review of the professional literature, and lessons from the Midlands Consortium Star Schools Project relative to the process of implementing a satellite-based distance learning program.

THE MIDLANDS CONSORTIUM STAR SCHOOLS PROJECT (MCSSP)

The Midlands Consortium was a partnership of elementary and secondary schools, state departments of education, state school boards associations, and leading universities in five predominantly rural states. The states currently represented in the Midlands Consortium are **Alabama, Kansas, Mississippi, Missouri** and **Oklahoma**. These states have a high percentage of geographically disadvantaged schools and schools which serve a high proportion of Chapter One students. The Oklahoma State University Education and Research Foundation serves as the fiscal agent and managing partner for the Consortium. Since the end of the Star Schools Project on December 31, 1990, each of the partner states is continuing to pursue its own distance education agenda.

Mission and Goals

The **mission of the Midlands Consortium** was to enhance educational opportunities for students, educators and life-long learners by integrating technology and instruction.

The **goals** of the Consortium were to:

1. Equip schools and other centers of learning with satellite downlinks and other equipment for distance learning;
2. Produce interactive electronic programming for students and other learners;
3. Produce interactive electronic staff development programs;
4. Provide technical assistance and training;
5. Identify, evaluate and disseminate information on distance learning; and
6. Conduct research and evaluation activities.

Although a final evaluation of the Star Schools Project is still being conducted, the preliminary report indicates that the goals were successfully met.

IMPLEMENTING A TELECOMMUNICATION-BASED DISTANCE EDUCATION PROGRAM

The implementation of a distance learning program should follow a **process** model and include as a goal the ***integration*** of the distance learning program into the curriculum. Distance learning, as is the case with any technology innovation, cannot survive and meet the needs of the school for long if it is only a curriculum adjunct. For distance education to succeed, it must become an institutionalized part of the total school curriculum, in place because it meets some critical need which the school has.

Any educational organization which is considering implementing a distance learning program should consider critical issues and plan for objectives in each of the following areas:

1. **Curriculum,**
2. **Organizational and Financial,** and
3. **Technical.**

Following is a model implementation plan founded on these three areas.

Table 1

An Implementation Plan for Educational

Satellite Networks

Feasibility Phase

CURRICULUM COMPONENT	ORGANIZATIONAL & FINANCIAL COMPONENT	TECHNICAL COMPONENT
Identify specific curriculum needs	Obtain outside planning assistance	Identify & evaluate existing infrastructure
Identify specific administrative needs	Review internal funding options	Specify the types of information to be transmitted
Prepare a statement of goals & objectives	Review external funding options	Evaluate the potential of current and future communication technologies
Study local & state curriculum requirements	Specify criteria for partner(s)	Consider interactive requirements

Table 1 (Continued)

CURRICULUM COMPONENT	ORGANIZATIONAL & FINANCIAL COMPONENT	TECHNICAL COMPONENT
Evaluate all options to meet needs	Consider lease/purchase options	Evaluate network infrastructure options
Form a preliminary distance education committee	Identify party responsible for maintenance	Consider implications of hardware and software selection
Evaluate educational telecommunications applications		Prioritize equipment needs
Thoroughly review literature & learn from other projects		Prepare bid specifications for hardware & software
Consider policy or regulatory barriers		
Make site visits to other projects		
Complete a planning guide		
Develop an evaluation plan		
Implementation Phase		
Finalize membership of distance education committee	Identify partners	Accept bids
Distance education committee meets regularly	Obtain commitments of political support	Sign vendor contracts
Design courses (if locally produced)	Obtain commitments of financial support	Monitor contractor(s)

Table 1 (Continued)

CURRICULUM COMPONENT	ORGANIZATIONAL & FINANCIAL COMPONENT	TECHNICAL COMPONENT
Subscribe to programming	Consult faculty & staff; communicate & seek support	Train staff
Identify faculty or staff who will operate or supervise the system	Prepare grant application(s)	Contract for maintenance services
Identify faculty who are willing and able to teach	Request state & federal agency assistance &/or support	
Conduct inservice education	Influence legislation & regulations	
Collect data for evaluation	Prepare budget	
Prepare evaluation report	Disseminate results to constituents	
Institutionalization Phase		
Revise curriculum as required	Continue to develop funding sources	Maintain equipment
Seek new courses & sources of programming	Continue to influence policy & regulations	Amortize equipment
Add enrichment programs as needed	Attempt to influence legislation	Upgrade equipment as needed
Continue professional development for faculty		Add new equipment as necessary

Curriculum Component

The initiation point for the implementation of a distance learning program is education. Technological innovations, such as telecommunication-based distance learning, should never be implemented unless a critical **need** has been identified and a less costly or more effective method of meeting the need is unavailable. Therefore, the school should

begin by identifying and prioritizing local needs which may result from factors such as limited school financial resources, restricted curriculum offerings, or mandated school services. Among the needs which can potentially be met by a well-implemented distance learning program are:

1. **equity** in access to learning resources,
2. **information** access,
3. access to **experts for enrichment**,
4. **interaction**,
5. **timely** access to information,
6. **pupil shortages**,
7. **teacher shortages**,
8. **staff development**,
9. cost **reduction**,
10. cost **effectiveness**, and
11. adult and **community education**.

For example, the need to provide expanded curriculum resources motivated many of the schools which participate in MCSSP programming do so in order to offer foreign language or advanced placement courses which may be difficult to offer in small schools with limited enrollments.

Generally, distance education programming can be classified into one of the following four categories:

1. Curriculum enhancement,
2. Curriculum enrichment,
3. Information resource, and
4. Professional development.

Curriculum enhancement refers to full courses for credit. Typically, these courses are in areas such as advanced science, mathematics, or foreign language. Often, the school cannot offer these courses either because there is no qualified teacher available or because there are too few students to justify the class. Curriculum enhancement programming is exemplified by courses such as German, Russian, Chemistry, and Physics which are taught by university faculty at Oklahoma State University (OSU) and transmitted via satellite to high schools nationwide. These courses are managed by the OSU Arts and Sciences Teleconference Service.

Curriculum enrichment courses are short programs which supplement an existing class. For example, the Jason Project, in which various scientific expeditions are transmitted to schools, may be utilized to supplement an existing physical science class. The National Aeronautics and Space Administration (NASA) also transmits curriculum enrichment programs which are utilized to supplement the science curriculum, having even transmitted one class from space which featured instruction from astronauts on the electromagnetic spectrum. Curriculum enrichment may be the fastest growing area of distance education--the National Oceanic and Atmospheric Administration (NOAA), the Cable News Network (CNN), Whittle Communications, the Hughes Aircraft Company, and National Geographic are among the numerous companies and agencies providing such programming.

Telecommunication systems may also be utilized as an **information resource** which serves as an adjunct to traditional instructional classes or provides an opportunity for extended study. These systems often take the form of electronic bulletin boards where data

about various topics may be stored, searched, and retrieved. For example, NASA maintains an electronic data base called *SpaceLink* which contains information about the space program.

Finally, **professional development** programs are available from a variety of vendors, mostly universities. The majority of these are non-credit programs of one to eight hours duration which are designed to upgrade professional skills through instruction from specialists. Credit courses are also available through satellite, cable, and computer networks. For example, the OSU College of Education has taught 60 different professional development workshops representing nearly 200 hours of instruction. Included has been two courses for graduate credit in education

It is also recommended that the distance learning program be planned and implemented by a **broad-based group** representing teachers, administrators, support personnel, parents and school board members. In particular, teachers are an essential group to consult with and involve in the planning and implementation process. **Teachers will have many legitimate questions and concerns** relative to the impact of distance learning on their jobs which can best be addressed by involving them in all aspects of the program. **Teacher training**, to cite just one example, is an area that must be addressed adequately. It is impossible to overestimate the importance of a well-trained, knowledgeable and supportive local instructional staff.

State departments of education are beginning to develop policy guidelines for **accrediting** distance learning programs. Different states are, however, at different points in this process; some states have formal, published guidelines while others accredit distance learning courses on a provisional basis in the absence of a policy statement. In either case, it is essential for both the program producer and the local school to ensure that courses which have been selected or proposed meet the relevant accreditation standards.

Finally, a **program provider** must be selected and in many subject areas there will be more than one available. It is recommended that the school consider at least the following:

(1) The **cost** of subscription and any other associated fees,
(2) The qualifications and presentation **ability of the instructional faculty**,
(3) The **production values** of the courses as reflected in the program quality, and
(4) The mechanism for providing **local support** through **ancillary curriculum materials** and **local educational personnel**.

In summary, curriculum considerations should include at least include the identification of need; the involvement of numerous groups in planning and implementation; the consideration of accreditation issues and the selection of a reliable, high-quality program provider.

Organizational & Financial Component

The purpose of the organizational and financial component is to:

1. **Form partnerships and groups to accomplish work and distribute effort**. These groups may consist of regional consortia, small networks of

two or more schools, or partnerships composed of elementary schools, secondary schools, and higher education.

2. **Develop sources of funding**. Funding may come from local line item budget designations, bond issues, state funding, or grants from public or private sources. As stated by Otterman and Pease (1989), "Public agencies alone are rarely able to fund a DLS [distance learning system] without receiving special funding or corporate sponsorship" (p. 7).

3. **Provide support, lobbying efforts, etc**. Important issues such as accreditation and certification need to be monitored to ensure that guidelines are compatible with telecommunication opportunities.

Specific major tasks to be accomplished will include writing grants, finding and inviting partners, and specifying staffing plans.

Distance learning programming can be a ***cost-effective*** method of providing educational services. Research has shown that the cost of educating a student via distance learning technologies is about the same as for traditional instruction, $5.00 per hour.

For the local school considering satellite-based distance learning, the administration should **budget** for:

1. **Equipment** (see below);
2. Program **subscription fees**;
3. Textbooks and support **materials**,
4. **Maintenance**, repairs & upgrades; and
4. **Local** teaching and support **staff**.

There are a variety of sources of external funding which the school can consider including:

1. **State** allocation funds,
2. **Rural electric cooperatives**, and
3. State or federal **grants** (e.g. Star Schools, Rural Star Schools).

Participation in various types of **partnerships** can be highly effective in reducing costs and are recommended if possible. For example, if several schools in a particular geographic area can purchase equipment as a group, substantial savings can result. Additionally, partnerships with local businesses or utilities can be effective.

The **existing base of technical resources** should be evaluated for possible utilization. Many schools are currently wired for cable and the cable operator may be able to transmit programming to schools using the existing cable and an educational access or unused channel on the system.

Finally, a **base of local and state political support** for the distance learning program is essential. If that base of support is not in place an adequate budget cannot be established and maintained to support the distance learning program.

Technical Component

There are many different formats being utilized for the delivery of distance learning. Satellites, fiber optics, cable and microwave are among the transmission media which have

been utilized effectively. At this time, satellite technology is the most effective transmission method for most types of distance learning delivery for a national audience.

For the local school, the major technical consideration will be the selection and installation of a satellite receiving system. Following are some suggestions for purchasing and installing **satellite receiving equipment**:

1. Specify a **dual-band** (C/Ku) system to provide the broadest possible range of programs;
2. Specify a **steerable, polar-type** antenna mount and a dish size adequate for the geographic location;
3. Plan to purchase via **competitive bid** (required in most schools) to ensure that the best possible pricing is obtained;
4. Perform a **site survey** to ensure that physical or electrical sources of interference with signal reception are avoided;
5. Utilize a **ground mount** if possible;
6. Select equipment, especially the satellite receiver, which is "**user-friendly**";
7. Install a **high-resolution large-screen monitor** which can be seen by all in the selected room;
8. Ensure that a **reliable installer** with excellent references is **contracted** to perform the installation; and
9. Consider **wiring more than one room** at the time of installation, bearing in mind that multiple rooms will require multiple satellite receivers unless all will be viewing the same program.

A list of the equipment selected by the Midlands Consortium Star Schools Project is in the appendix. A school should *budget* approximately $10,000 for a reliable satellite receiving system and installation. In reality, a substantially lower cost can be realized through efficient purchasing practices. Do not, however, unwisely sacrifice quality or reliability as the receiving system is the essential component required to receive the program.

CONCLUSION

In conclusion, by planning and providing exemplary solutions in the areas of curriculum, organization and finance, and technical infrastructure, successful satellite-based distance learning networks can be created and maintained. The ultimate beneficiary of the network is, at it should be, the student, who will have expanded and enhanced course offerings.

SELECTED REFERENCES ON DISTANCE LEARNING NETWORK IMPLEMENTATION

For the school considering implementing a distance learning program, the following references are recommended.

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U.S. Office of Technology Assessment. *Linking for Learning: A New Course for Education*. Washington, DC: U.S. Govt. Printing Office, [(202) 783-3238]. (Stock Number 052-003-011701). 1989.

APPENDIX

SATELLITE RECEIVING SYSTEM CHECKLIST

1. Steerable, polar mount.
2. Dual frequency bands (C/Ku).
3. Remote operation with programmable satellite locations.
4. Building distribution system serving multiple locations.
5. Full-arc coverage of all U. S. domestic communication satellites.
6. Adequate antenna size for geographic location.
7. Solid mounting base, preferably on ground (with security fence).
8. Classroom equipment; high-resolution monitor and VCR.
9. Warranty and maintenance/service agreement.
10. Decoder for any programming services operating coded (scrambled) signals.
11. Special equipment such as printer, computer, or data controller for any programming services using such equipment.
12. No interference from electromagnetic sources such as microwave transmitters or power lines.
13. No physical blocks, such as buildings or trees, between the antenna and satellite.

STAR SCHOOLS PROJECT
Satellite Receiving System
Equipment Summary

1. Prodelin 3.7 meter satellite receive-only antenna
   Features:
   a. C/Ku frequency band reception
   b. Polar mount
   c. Steerable
   d. 10-piece reflector
   e. Capable of receiving all US comm. satellites
2. Chapparal Sierra III satellite receiver
   Features:
   a. Remote control operation
   b. C/Ku frequency band selectable
   c. On-screen graphics
   d. Auto. selects satellite positions
   e. Optional descrambler (Videocipher II)
3. Zenith Model SE 27911 TV/Monitor
   Features:
   a. 27-inch screen size
   b. Remote control operation
   c. Digital technology
   d. Super VHS interface and adapter
   e. MTS stereo
   f. On-screen graphics
4. Zenith Model VRE 550 HF Video-cassette Recorder
   Features:
   a. Super VHS
   b. Remote control operation
   c. Four video heads
5. Panasonic KX 3842 Cordless Telephone
6. Bretford VTRC 70E TV/VCR Cabinet
   Features:
   a. 6-outlet AC power strip/surge protector
   b. Door security locks
7. All equipment includes one year warranty, operator manuals, and installation as required for a complete satellite receiving system.